

wherein the adsorbent substantially maintains its adsorbent capacity and preference for the alkene when the hydrogen sulfide is present in amounts greater than about 3 ppm.

11. (Twice Amended) A sulfur tolerant adsorbent for preferential adsorption of gaseous alkene from a gaseous mixture including the alkene and hydrogen sulfide, the adsorbent comprising:

a carrier; and

a silver compound supported on the carrier, wherein the silver compound is a silver salt, and wherein the salt is selected from the group consisting of acetate, benzoate, bromate, chlorate, perchlorate, chlorite, citrate, fluoride, nitrate, nitrite, and sulfate;

and wherein the adsorbent substantially maintains its adsorbent capacity and preference for the alkene when the hydrogen sulfide is present in amounts greater than about 3 ppm.

15. (Twice Amended) A method for separating a diene from a mixture including the diene and a sulfur compound, the method comprising the step of:

contacting the mixture with an adsorbent which preferentially adsorbs the diene, at a selected temperature and pressure, thereby producing a non-adsorbed component and a diene-rich adsorbed component, wherein the adsorbent comprises an ion-exchanged zeolite selected from the group consisting of zeolite X, zeolite Y, zeolite LSX, and mixtures thereof, the zeolite having exchangeable cationic sites, and a majority of the sites having silver cation or copper cation present, and wherein the preferential adsorption occurs by π -complexation, and further wherein the adsorbent substantially maintains its adsorbent capacity and preference for the diene when the sulfur compound is present in amounts greater than about 3 ppm.

34. (Amended) A method for separating a diene from a mixture including the diene and hydrogen sulfide, the method comprising the step of:

contacting the mixture with an adsorbent which preferentially adsorbs the diene, at a selected temperature and pressure, thereby producing a non-adsorbed component and a diene-rich adsorbed component, wherein the adsorbent comprises an ion-exchanged zeolite selected from the group consisting of zeolite X, zeolite Y, zeolite LSX, and mixtures thereof, the zeolite having exchangeable cationic sites, and at least some of the sites having silver cation or copper cation present, and wherein the preferential adsorption occurs by π -complexation, and further wherein the adsorbent substantially maintains its adsorbent capacity and preference for the diene when the hydrogen sulfide is present in amounts greater than about 3 ppm.

48. (Amended) A method for separating a diene from a mixture including the diene and hydrogen sulfide, wherein the diene is selected from the group consisting of butadiene, hexadiene, octadiene and mixtures thereof, wherein the mixture comprises at least one mono-olefin having as many carbon atoms as the diene, and wherein the mono-olefin is selected from the group consisting of butene, hexene, octene, and mixtures thereof, the method comprising the steps of:

contacting the mixture with an adsorbent which preferentially adsorbs the diene, at a selected temperature and pressure, thereby producing a non-adsorbed component and a diene-rich adsorbed component, wherein the adsorbent comprises an ion-exchanged zeolite selected from the group consisting of zeolite X, zeolite Y, zeolite LSX, and mixtures thereof, the zeolite having exchangeable cationic sites, and at least some of the sites having silver cation or copper cation present, and wherein the preferential adsorption occurs by π -complexation, and further wherein the adsorbent substantially maintains its adsorbent capacity and preference for the diene when the hydrogen sulfide is present in amounts greater than about 3 ppm;

changing at least one of the pressure and temperature to thereby release the diene-rich component from the adsorbent, wherein the selected pressure of preferential adsorption is a first pressure, and the pressure of release is a second pressure less than the first pressure, wherein the first pressure is in a range of about 1 atmosphere to about 35 atmospheres, and wherein the second pressure is in a range of about 0.01 atmosphere to about 5 atmospheres;

and wherein the selected temperature of preferential adsorption is a first temperature, and the temperature of release is a second temperature greater than the first temperature, wherein the first temperature is in a range of about 0°C to about 150°C, and wherein the second temperature is in a range of about 70°C to about 250°C.

55. (Amended) A sulfur tolerant adsorbent for preferential adsorption of gaseous diene from a gaseous mixture including the diene and hydrogen sulfide, the adsorbent comprising:

an ion-exchanged zeolite selected from the group consisting of zeolite X, zeolite Y, zeolite LSX, and mixtures thereof, the zeolite having exchangeable cationic sites, and at least some of the sites having silver cation or copper cation present, wherein the preferential adsorption occurs by π -complexation; and

wherein the adsorbent substantially maintains its adsorbent capacity and preference for the diene when the hydrogen sulfide is present in amounts greater than about 3 ppm.